

AMES LAB INSIDER

Although the sun wasn't out, the people were. No mere tantrum of nature could dampen Veishea's ultimate adventure. A brilliant red, blue, green and yellow sidewalk sign and matching banner in front of Spedding Hall invited people in for Adventures In Science, Ames Lab's Veishea open house exhibit. Following a brief adventure in the Spedding Hall elevator, visitors arrived at the third floor conference room where science was on display. Offering a broad view of who we are and what we do, the exhibit focused on the Lab's strengths in the areas of analysis, materials, parallel computing, environmental management, technology transfer and science education.

Ames Lab's newest solar-powered vehicle, the Sun Ranger, was on display in front of Metals Development attracting many visitors and out-of-luck sun worshipers searching for anything remotely connected to that fiery celestial body.

Proving that Veishea could be wet yet wonderful at the same time, many people followed through with traditional activities, including open houses, the parade and visits to food stands for cotton candy and hot dogs. Direct testimony are these photos depicting a prevailing Veishea spirit.



Adventures in *Science*
VEISHEA '91

Texas Students, Lockheed, ISU and Ames Lab Team Up For Cleanup

Three mechanical engineering seniors from the University of Texas at Austin, accompanied by sponsors from the Lockheed Missiles and Space Company, visited Ames Laboratory May 2-3 to present the results of their senior design project that may aid in the design of a system being developed at Ames Laboratory and ISU to clean up hazardous waste sites.

Their efforts may become part of a new robotic system. Incorporated into a mobile unit, a robotic probe will analyze materials from hazardous waste sites, eliminating risks of exposure commonly associated with obtaining and testing such samples.

Part of "Project Earthworm" (ER/WM - Environmental Restoration and Waste Management), the robotic soil sampler will be much more efficient and economical than current sampling methods, according to Ames Lab Senior Chemist Art D'Silva. Utilizing direct sampling with a laser beam sent to the site through an optical fiber and performing analysis in real-time, the system will provide information on contaminants in just a few seconds and allow cleanup to proceed quickly. Current methods require obtaining many samples which have to be sent away for analysis, wasting time and driving up costs.



Learning from the master - Texas students (left to right) Doug Barnes, Oscar Gonzalez and Dan Devereux watch closely as Senior Chemist Art D'Silva explains the instrumentation to be utilized in the robotic soil sampling system.

Careful organization and planning united the University of Texas students, Lockheed and Ames Lab staff, and ISU engineering students and professors in this collaborative, interdisciplinary effort to develop a design for the robotic soil sampler. Masterminding the alliance was Ed Jaselskis, Ames Lab associate and ISU professor of civil and construction engineering.

Attending a Department of Energy (DOE) ER/WM conference in Albuquerque in the summer of 1990, Jaselskis introduced the concept of D'Silva's robotic soil sampler to Lockheed representatives. Lockheed was interested in applying some of their technology and resources toward DOE ER/WM tasks. "There was a definite interest and desire to cooperate with Jaselskis on the Ames Lab Earthworm project, yet no mechanism to make it happen was established at that time,"

notes Al Morgan, Lockheed engineer.

However, it wasn't long until that mechanism appeared in triplicate. Doug Barnes, Dan Devereux and Oscar Gonzalez, University of Texas mechanical engineering students, were looking for realism in a senior design problem. Having sponsored several past projects for the University of Texas senior design class, Lockheed was again among the industries contacted for a challenging, realistic problem. "All of a sudden I put two and two and three together and said, 'let's try to do a senior project with Ames Lab,'" recalls Morgan, Lockheed sponsor for the University of Texas students.

"What these students faced is a very real, non-trivial problem," emphasizes Ames Lab Associate Chemist Stephan Weeks. Developing a preliminary design for a subsurface robotic probe that will obtain soil samples, the students had to fit several different systems, such as one to focus and aim a laser, into a cylindrical casing less than six inches in diameter. "They did an outstanding job," says Jaselskis, who is supervising development of the robotic components of the new system.

"The students did a tremendous amount of thinking and designing in less than a three-month time period," praises D'Silva.

Teamwork for the robotic soil sampler project paid off over Veishea weekend when all team members from the University of Texas, Lockheed, Ames Lab and ISU took the playing field and

presented their individual parts of the project during a formal meeting.

"The different tasks needed to be integrated in order to take the next step which, we hope, is to build a prototype and demonstrate that the robotic sampler is of value," explains Morgan. "There is so much desire by nearly everyone to clean up the environment; that's going to



Getting their first look at instrumentation for the robotic soil sampler, Texas students Doug Barnes (left), Oscar Gonzalez (right), and Lockheed sponsor Al Morgan (center) examine the rastering mechanism of the laser ablation system.

take good engineering," he concludes.

Ames Lab, ISU and Lockheed plan to extend the robotic soil sampler project through the summer semester. Due to graduation, the three University of Texas students will no longer be involved, however, other students will continue the work in cooperation with Jaselskis, Morgan and Ames Lab scientists. Improving, modifying and integrating the existing designs, the goal is to move toward demonstrating a surface sampling prototype by fall. □

Governor's Science Medals Go To Ames Lab Researchers

Senior Chemist **DENNIS JOHNSON** and Senior Scientist **TOM WHELOCK** are recipients of the 1990 Governor's Science Medal. The two researchers were honored on May 1 during luncheon ceremonies with Governor Terry Branstad at the governor's office.

"It's nice to have your work recognized, especially at home," notes Johnson who received the Science Application Award for inventing a novel detection method that



Dennis Johnson

allows more thorough and complete analysis of complex carbohydrates. Pulsed Amperometric Detection (PAD) utilizes basic principles of electrocatalysis in combination with liquid chromatographic (LC) analytical processes. Marketed by the Dionex Corporation in Sunnyvale, Calif., LC-PAD is the successful product of a

cooperative endeavor between academia and industry.

In a valuable application of Johnson's work, the LC-PAD technique is employed by researchers in the pharmaceutical industry to analyze carbohydrates in glycoproteins such as those that are found in viruses. Ultimately, it is anticipated that LC-PAD results will lead to more efficiently designed compounds that target and destroy viruses.

"The Governor's Science Medal is a very nice honor," says Wheelock, recipient of the Science Achievement Award for significantly advancing the level of knowl-



Tom Wheelock

edge in his field. "I'd like to share the credit with my colleagues in the Chemical Engineering Department and the graduate students who worked with me. I also received a lot of support from other ISU faculty members, Ames Lab and the Iowa State

Mining and Mineral Resources Research Institute (ISMMRRI)."

As our country increases its use of coal to meet ever-rising energy needs, related environmental problems multiply. Wheelock's investigations on the precombustion treatment of coal resulted in improved coal-cleaning technologies that help curb environmental risks by substantially limiting the number of pollutants given off during the burning process.

Wheelock was also a key player in establishing the Iowa Coal Project at Iowa State. His work on the desulfurization of coal parallels the project's goal of developing treatments for high-sulfur coal that restrict pollutants. □

Business Associate of the Year

Exasperated by a Kodak copier that insists on flashing its error message during rush jobs, many Ames Lab employees seek the help of Donna Millang, secretary in the Office of Information. With a cheerful smile, Millang corrects the problem and resolves operator/copier power struggles.

This characteristic friendly and helpful service is one of many qualities that led to Millang receiving the 1991 American Business Associate of the Year award from the Ames Silver Satellite Chapter of the American Business Women's Association. "It was a total surprise; I consider it a real honor," says Millang.

The American Business Women's Association was founded in 1949 on the premise that, together, working women could determine their own futures. Individual chapters within the association offer members the opportunity to network with



Donna Millang

other women professionals and community business leaders in an atmosphere of fellowship.

Able to interact effectively with a wide variety of people, Millang finds answers and solves many problems. Millang coordinates Office of Information activities and supervises clerical staff. "She's a very cooperative, pleasant person to work with," notes Dianne Borgen, Editor of the *Ames Lab Insider*. "That makes all the difference in the world when you need to get a job done!" □

Awards

The 1991 ISU Spring Convocation and Awards Ceremony honored several Ames Lab employees for outstanding teaching, significant research and responsive service. During the May 9 ceremony, Interim President Milton Glick said, "We can all take pride in our colleagues being honored today. And we can take pride in a university that values achievement and excellence and honors those who typify those qualities."

Distinguished Professor Awards

The title of Distinguished Professor is the highest academic honor bestowed by ISU. The awardees receive \$1500 honoraria and retain the title the remainder of their careers at the university.

GERALD SMALL, senior chemist, received the title of Distinguished Professor of Liberal Arts and Sciences. An international authority on



Gerald Small

using lasers to analyze the chemical structures of plants, carcinogens and amorphous

(glassy) materials, Small is widely recognized as one of the leading authorities on the laser spectroscopy and photophysics of molecules and condensed phase molecular systems. A creative and versatile chemist, he has published over 100 papers and is a member of the editorial boards of the journals *Chemical Physics* and *Journal of Chemical Physics*. He chaired the 1985 Gordon Research Conference on Molecular Electronic Spectroscopy and served as an elected member of the Executive Committee of the Division of Physical

Chemistry of the American Chemical Society from 1987-89. Small received his B.S. degree in 1963 from the University of British Columbia and his Ph.D. in 1967 from the University of Pennsylvania.

ROHIT TRIVEDI, senior metallurgist, received the Anson Marston Distinguished Professor in Engineering award. Recognized by his



Rohit Trivedi

peers as the premier theoretician in modeling the solidification process of advanced materials, he is one of the top experimentalists working in this area. His work has elevated the basic knowledge and understanding of the nature of solidification and the resulting solid microstructures to a high level of sophistication, and has had immense impact in materials engineering and advanced technological processing of materials. These contributions were recognized by a Senior Fulbright Research Award and a Senior Alexander Von Humboldt Award. Dr. Trivedi has published 93 papers in technical journals and is the senior editor of a two-volume book, *Fundamentals of*

Solidification and Materials Processing. He has also presented 120 invited papers at various international and national meetings and seminars. Trivedi earned his

B.Tech degree in 1960 from the Indian Institute of Technology, his M.S. in 1964 and Ph.D. in 1966 from Carnegie Mellon University. □

Professional and Scientific Excellence Awards

The Professional and Scientific Excellence Award recognizes P&S staff for outstanding contributions and achievements in their respective fields, both within and beyond the university. The awardees each receive a \$1000 honorarium and an engraved obelisk.



Harvey Burkholder and Roland Struss display their awards.

HARVEY BURKHOLDER, lab associate II, won a P&S Excellence Award for his dedication to the education of the individual student, continually modifying facilities and procedures to improve the effectiveness of teaching and laboratory instruction. His record of running well-managed laboratory courses, developing new experiments and acquiring new equipment is exemplary. He has initiated significant improvements to experimental apparatuses and procedures. In addition, he has made many corrections and improvements to written experimental procedures, culminating with the revision and update of the entire set of laboratory manuals for

Chemistry 312, 316, 321, and 325L. "I get lots of help and cooperation from everybody in the chemistry department," smiles Burkholder. "That's why I got the award." Burkholder earned his B.S. degree in 1954 from the University of North Dakota.

ROLAND STRUSS, associate director for operations, received a P&S Excellence Award for his contributions as an imaginative engineer. He recently accepted the responsibility as project engineer in the development and construction of a unique atomic beam scattering facility in Ames to study the properties of materials surfaces. In the

early 1970s, Struss designed the neutron instruments installed around the Lab's research reactor. The design of the Lab's triple-axis spectrometer was so elegant, efficient and economical that the National Bureau of Standards purchased a similar instrument from Ames Lab and installed it at their reactor. After Ames Lab's reactor was shut down, Struss was respon-

sible for the relocation of its instruments to Oak Ridge National Lab.

Last year he worked with ISU's engineering students in building the solar car, and this spring he initiated the design and building of Ames Lab's new solar truck. Struss earned B.S. degrees in 1953 and 1957 from the University of Nebraska and his M.S. degree in 1966 from ISU. □

Early Achievement in Research

This award honors faculty members who have received national recognition for research accomplishments unusually early in their professional careers. The awardee receives a \$1000 honorarium.

STEVE MARTIN, associate, received the ISU Foundation Award for Early Achievement in Research. Since coming to ISU in March 1986, Martin has established a reputation as one of the bright young scientists in the study of glass. Specializing in the structure and property relationship of phosphate glasses, he has broadened his research into the area of sulfide glasses. These new sulfide glasses have applications ranging from glassy solid electrolytes in new all-solid-state lithium batteries to optical fibers for laser surgery with the carbon dioxide laser. To prepare these highly reactive glasses, Martin has developed a state-of-the-art glass preparation laboratory

that has two stainless steel vacuum glove-boxes as the center of the facility.

Martin has also created an instrumentation laboratory



Steve Martin

housing some \$500K worth of state-of-the-art computer automated instrumentation that allows fast, efficient and highly reliable acquisition of data. He is also co-principal investigator and co-author of a \$1.3 million National Science Foundation grant to promote research careers in engineering for minority scholars. Martin's research group consists of nine graduate students, two postdoctoral research fellows and five undergraduate research assistants. He earned his B.A. degree in 1980 from Capital University and his Ph.D. degree in 1986 from Purdue University. □

International Symposium Honors Chemist

Scientists from the United States, Canada and seven European nations were in Ames recently to honor an Ames Lab chemist who never performs experiments.

One-hundred researchers recognized the contributions of Senior Chemist **KLAUS RUEDENBERG** at a symposium held in his honor on May 9-11. The symposium, "*Ab Initio* Methods in Quantum Chemistry" was sponsored by Ames Lab and IPRT and supported by IBM Corporation, Digital Equipment Corporation and NASA's Ames Research Center.

"I feel very honored that so many of the world's top quantum chemists came and made this symposium one of the best conferences on rigorous quantum chemistry in a long time," Ruedenberg says. "I am deeply grateful to Stephen Elbert, chemist, and Andrew Korminicki of the NASA Ames Research Center, Moffet Field, Calif., for conceiving the idea and doing such an excellent job in carrying it out."

"Professor Ruedenberg is very central to modern quantum chemistry," says Björn Roos, a theoretical chemist from the University of Lund in Sweden and one of 21 scientists speaking at the symposium. "He's done a lot of profound work that has had a great deal of impact on many people."

Henry Schaefer, director of the University of Georgia's

Center for Computational Quantum Chemistry says, "Ruedenberg's work is both remarkably original and remarkably thorough, and to



Ruedenberg (left) and Director Tom Barton at the symposium banquet.

find both of those qualities in the same individual is very, very rare. When Klaus Ruedenberg works on a problem, the problem is solved."

Ruedenberg never experiments on the material he is studying. Instead, he uses the laws of quantum mechanics to deduce useful information about a substance, such as the conditions needed to push a substance into a chemical reaction. Even on high-speed supercomputers, the technique is extremely complex and time-consuming, but it provides useful information where experimental methods fail because of chemical instability, rapid chemical change or other problems.

Ruedenberg says the impact of quantum chemistry on basic research in experimental chemistry is now widely recognized and steadily increasing. He predicts that before too long chemistry departments will soon have service groups in computational chemistry as they now have in instrumental physical methods. □

Koki Ikeda, a postdoctoral fellow in Karl Gschneidner's group from 1978-80, died in Japan on April 5, 1991. Ames Lab colleagues were saddened by his sudden and premature death due to a bacterial infection following a March operation for an ulcer.

Copies of the 1991 Holiday Inn Worldwide Government and Military Rate Directory are available in the Ames Lab Travel Office. Coupons for free room upgrades, free continental breakfasts and 10% dinner discounts are also available.

Volunteers are needed to work at Ames Lab's booth at the Iowa State Fair from August 14-25. There are two shifts per day with two people per shift on week-days, and three people on weekends. The first shift is from 9 a.m. to 3 p.m. and the second shift is from 3 p.m. to 9 p.m. Please obtain approval from your program manager before signing up. Contact Saren Johnston at 4-3474 to volunteer. Thank you very much for your help and participation.

Ames Lab group photos, 8" x 10" glossy, may be ordered for \$1.50 from Donna Millang, Office of Information, 4-1856. Please specify whether you want the scientific or administrative photo.

REMINDER: Safety Responsibilities

It is each employee's responsibility to insure that children and visitors are restricted in their access to research laboratories, particularly during nonworking hours. There are too many opportunities for self-injury. Every employee who invites casual visitors into the Laboratory must assume the responsibility of supervising their activities to avoid injury or misuse of Laboratory facilities. **"Baby-sitting" and children running through hallways is also prohibited.**



Joel Calhoun has returned from the Persian Gulf and is back at work in the Rare-earth Information Center. At his welcome home reception Calhoun reported his active duty assignment sent him around the world by car, plane and ship. Commenting on his return to the U.S., Calhoun smiles, "I'm delighted to be back."

Anyone interested in purchasing an Ames Lab T-shirt can pick up an order form from Cheryl Jacobson, Office of Information, 201 Spedding. T-shirts offered this year will have a new design. Deadline for ordering is July 8.

The Office of Information, 201 Spedding, maintains a master set of DOE Orders containing new and revised orders. If you receive an order directly, please send a copy to Donna Millang to help keep the set as complete as possible. If you need a DOE Order, contact Millang at 4-1856. If the order is not on file, it can be requested from Chicago Operations.

Sloan Research Fellow

An Ames Lab associate became the Lab's seventh Alfred P. Sloan Research Fellow and the first one since 1984.

NENAD KOSTIĆ won the \$30,000 award and received a letter from Ralph E. Gomory, president of the Sloan Foundation, stating, "This is an extraordinarily competitive award, involving nominations for most of the very best scientists of your generation from around the country. I hope that your selection from among this remarkable group of nominees will give you particular personal satisfaction, and convey a clear indication of the high esteem in which your past work and future potential are held by your fellow scientists."

Under the terms of the National Science Foundation (NSF) Presidential Young Investigator Award which



Nenad Kostić

Kostić won three years ago, the NSF matches any research grants that he wins from private or corporate sources. He will therefore receive a matching \$30,000 from NSF for a total of \$60,000.

Kostić will use these unrestricted funds for new research projects. "The real challenge," he says, "will be to spend the money wisely and do some innovative science."

Kostić's work on electron-transfer reactions between

metalloproteins has attracted a lot of attention. He recently spoke at a Gordon Conference and gave invited lectures at several leading universities.

"This award was made possible by my able students and postdocs," says Kostić. "I'm fortunate to collaborate with them. My affiliation with the Ames Lab has strengthened scientific ties between my research group and

research groups in other areas of chemistry. It's not enough to roll up your sleeves and work in the lab; it is also important to talk with colleagues and exchange ideas."

Previous Sloan Fellows in the Ames Lab include Pat Thiel and Andrew DePristo (1984), Cheuk-Yiu Ng (1982), Walter Struve and Ed Yeung (1974), and James Espenson (1968). □

Zaffarano Prize

David Sanders, student associate, received the 1991 Zaffarano Prize for Graduate Student Research. The award recognizes superior performance in publishable research by a graduate student. Sanders' research is directed by Andrew DePristo, program director for Fundamental Interactions. The \$1000 prize is funded by an endowment presented to Daniel J.

Zaffarano at his retirement in 1988. A researcher at the Ames Lab from 1949 to 1971,



David Sanders

Zaffarano chaired the physics department before becoming ISU vice president

for research and dean of the graduate college.

"It's a very prestigious award and I'm honored to receive it," Sanders says. □

Marvin Thompson Retires

"I met a lot of great graduate students and worked with a lot of good people," smiles Marvin Thompson, looking back over his thirty-four years at Ames Lab. Thompson, a senior research technician in the Materials Preparation Center (MPC), retired on May 31, ending an Ames Lab career that began in March, 1957.

"I started out with Rick Schmidt during yttrium production; he worked with me and gave me on-the-job training," says Thompson.

"The thing that's so unique about Marv," notes MPC Director Rick Schmidt, "is that he's been actively involved in all major projects in the Metallurgy and Ceramics division since he started working at Ames Lab. Marv's most significant work is the technical development of the electro-transport of refractory and rare earth metals. He is able to obtain pressures as low as 5×10^{-12} torr, allowing Ames Lab to produce small quantities of metals having the world's highest purity. These metals are used in research programs and as analytical standards



Marvin Thompson

throughout the free world."

Seeing many people come and go during his years at the Lab, Thompson fondly recalls a graduate student by the name of Tom Ellis and

marvels, "I've now had the opportunity to work with his son Tim, melting copper-chromium samples in different crucibles."

Thompson's retirement plans are active ones. He hopes to find a flexible part-time job where he can take a day or two off when he wants to do yard work or play a little golf. Recently restoring a 1941 LA John Deere tractor, Thompson hopes to continue this hobby and restore other antique tractors during his retirement. One travel plan seems to be definite, a trip to Glacier National Park. □

You Should Have Seen the One That Got Away!

The first Ames Lab/IPRT fishing event took place on Saturday, April 27 at Big Creek Lake. Organized by Tom Wessels, associate scientist and Jerry Jenison, personnel officer, the event was originally planned to be a fishing tournament until organizers had a brief but enlightening conversation with a park ranger. "We



Is Les Reed really asleep or just wondering who told him this would be a fun time?

found out the tournament was illegal unless we had a permit, so we abandoned the original plans, just fished and had a good time," smiles Wessels. "I was the dominating force, not unexpectedly," he jokes. "I caught eight crappies, all keepers."

"It was unexpected that Wessels caught more fish than anyone else," quips Jenison. "Most of us thought it was probably the first time he'd ever caught any fish!"

Unfortunately, more than one fish got away during the day-long event. The fish fry that followed had to be supplemented by northern pike and walleye caught by Jerry Hand, machine shop manager, during his Canadian fishing trip last fall.

Better luck next year, folks!



"Bet my crappie fillet is bigger than yours," smirks Jerry Hand, displaying some of his Canadian catch.

La Café Spedding

Rumors of a sidewalk cafe being constructed on the east side of Spedding Hall, alas, are false. It seems the building needed a new roof and the sidewalk awning was constructed to block falling debris. "Given good weather,

the roof work should take about six weeks," says Michael Vaclav, associate engineer.

Although the awning-covered walkway invokes a romantic mood, no crisp white tablecloths, strawberries or champagne bottles have appeared to date. □



Ross Van Marel (left) and Tim Aspengren (right) construct a protective walkway.

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